

### **REMARKS/ARGUMENTS**

#### **Disposition of the Claims**

Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29, are pending in the present application.

#### **Amendments to the Claims**

In order to eliminate confusion, the claims were split into a process directed to sequentially formed polymers and a process directed to coupled polymers. Accordingly, Claim 1 has been amended to indicate that this claim is directed to a sequentially formed polymer. The claim has been further amended to clarify the titration step using the anionic polymerization initiator and the further addition of said anionic polymerization initiator. Support for these amendments may be found in paragraphs [0008] and [0018] of the application as filed. Claim 1 has also been amended to incorporate the content of Claims 6 and 8 to 10.

Claims 20 to 29 have been added to claim a process that is directed to a coupled polymer. Accordingly, Claim 15, has been canceled since this claim is incorporated into newly added Claim 20.

#### **First 35 U.S.C. § 103(a) Rejection**

The Examiner has rejected Claims 1 to 19 under 35 U.S.C. § 103(a) as being unpatentable over Jones, U.S. Patent Re. No. 27,145 (hereinafter "Jones"). This rejection is respectfully traversed with regard to Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29.

The claims of the present application are patentable over Jones since Jones fails to disclose, teach or suggest a process for preparing hydrogenated conjugated diene block copolymers which requires a titrating step involving the use of an anionic polymerization initiator followed by a polymerization initiation step that requires a second addition of anionic polymerization initiator. More specifically, the process of the present invention

involves a step that requires titrating an admixture of solvent, microstructure control agent, and alkenyl aromatic monomer using an anionic polymerization initiator in order to react away the impurities in the admixture prior to initiating the actual polymerization reaction, said step being followed by a step in which an additional amount of anionic polymerization initiator that will support the polymerization process is charged in order to form a living polymer.

In the rejection, the Examiner states that the "instant 'titration' step is an inherent step of [the] prior art initial process step, as all essential components are present". Applicant strongly disagrees with this statement since the particular manner in which Applicant titrates the admixture is not inherent in the prior art. With regard to the titration step, the present process differs from what is disclosed in Jones and this difference is an essential feature of the process now claimed. This is not a newly discovered result of a known process but is instead a new process which gives a new result when compared to the prior art processes.

In the process of the present invention, a hydrogenated conjugated diene block copolymer is prepared by (1) charging a solvent, a microstructure control agent, and an alkenyl aromatic hydrocarbon monomer into a first reactor thereby forming an admixture; (2) titrating the admixture by adding an anionic polymerization initiator incrementally to consume the impurities prior to initiating the actual polymerization, reaction and then charging an additional effective amount of anionic polymerization initiator to support the polymerization process in order to form a living polymer; (3) charging a prescribed amount of anionic polymerization initiator to support the polymerization process in order to form a living polymer, (4) allowing sufficient time for the living polymer to react with and incorporate the alkenyl aromatic monomer; (5) charging a conjugated diene monomer into the first reactor; (6) allowing sufficient time for the living polymer to react with and incorporate the conjugated diene monomer to form a living block copolymer; (7) charging an alkenyl aromatic hydrocarbon monomer into the first reactor; (8) allowing sufficient time for the living block copolymer to react with and incorporate the alkenyl aromatic monomer; (9) terminating the living block copolymer using a terminating agent;

(10) transferring the terminated block copolymer to a second reactor; and (11) hydrogenating the living block copolymer to form a hydrogenated conjugated diene block copolymer using a cobalt hydrogenation catalyst.

The process of Jones comprises the steps of (1) utilizing an alkyl lithium catalyst in a relatively inert hydrocarbon solvent for the block copolymer at each stage of its formation modified with a critically defined proportion of a polar compound of the group consisting of ethers, thio-ethers and tertiary amines; (2) forming a first polymer block of an alkenyl aromatic hydrocarbon in said medium to form a living polymer block; (3) adding butadiene thereto and continuing polymerization until the desired weight has been obtained; (4) thereafter introducing an alkenyl arene and continuing block copolymerization to finally obtain the A-B-A block copolymer wherein the center polybutadiene block has the recited degree of branched configuration.

The present process differs from what is disclosed in Jones in several respects. First, the present process requires a titration step in order to eliminate the impurities. These impurities prevent polymerization and cause premature chain termination. They change the stoichiometry of the polymerization by reacting with the initiator charge. These problems have been overcome in the present invention by first titrating the admixture of solvent, microstructure control agent and alkenyl aromatic hydrocarbon monomer with an anionic polymerization initiator to remove the impurities and then adding a second charge of anionic polymerization initiator for polymerization. This difference is an essential feature of the process now claimed. By not controlling this chemistry in a separate "titration" step, the process described in Jones results in poor control of molecular weight of the resultant polymer. Adding the polymerization initiator after a controlled titration step Applicant ensures the entire amount actually initiates polymerization thus providing superior molecular weight control. In addition, the fact that all of the components utilized in the process are disclosed is inconsequential since Applicant is claiming the manner in which these components are added together to prepare the hydrogenated conjugated diene block copolymer. It is this manner of addition that makes the difference in the product since this manner of addition allows the

production of clean block copolymers. Jones does not disclose, teach or suggest such a step.

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" MPEP § 2112, citing, In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). There is nothing in Jones which indicates that by adding the initiator in the manner now claimed by Applicant that it is possible to remove impurities and thereby prevent the polymerization of the monomers from occurring or cause a premature chain termination. Jones is directed to a process in which a polar compound is used for causing a limited amount of branching in the polybutadiene block (see, column 1, lines 18 to 22). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Id., citing, Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). No such basis has been provided in the present situation.

While Jones does indicate that the polar compound can be added in the first step of the process, once again, there is no indication that the initiator should be added to the other ingredients in a particular manner as in the present process. There is certainly no indication that the initiator should be first added in order to "react away" impurities followed by a second charge for actual polymerization. In fact, there is nothing within Jones which teaches or suggests this step, must less that teaches or suggests that this is an essential feature of the process. Absent such a teaching or suggestion, it cannot be said that process of the present invention is obvious in view of Jones.

Applicant further disagrees with the Examiner's statement that "Applicant's argument with respect to difference in products is irrelevant to the instant process" since it is this difference in product that is the result of a different process. By utilizing the

process of the present invention, Applicant is able to remove impurities that would either prevent the polymerization of the monomers from occurring or cause a premature chain termination. In any event, in the absence of the essential process step included in the present process claim, what would be achieved would be a product in which the initiator reacted with the impurities of the polar compounds thereby leading to what is commonly referred to as styrene die out. This is not a situation of a natural result flowing from a previous process or the discovery of results from a known process. This is instead a different process.

Accordingly, in the absence of some teaching or suggestion in Jones that it is necessary to titrate the admixture with initiator followed by a second charge of initiator as in the present process, it cannot be said that Jones renders Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29, unpatentable. Applicant therefore requests that the rejection of the claims of the present application, under 35 U.S.C. § 103(a) as being unpatentable over Jones be respectfully withdrawn in view of the above arguments.

#### Second 35 U.S.C. § 103(a) Rejection

The Examiner further rejected Claims 1 to 19 under 35 U.S.C. § 103(a) as being unpatentable over Graafland et al in view of Bening et al. This rejection is respectfully traversed with regard to Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29.

The claims of the present application are patentable over Graafland et al in view of Bening et al since nothing in Graafland et al, considered alone or in combination with Bening et al, discloses, teaches or suggests a process for preparing a hydrogenated conjugated diene block copolymer which includes a titrating step in which the admixture is titrated using an anionic polymerization initiator to react away the impurities prior to initiating the polymerization reaction and subsequently charging an additional amount of anionic polymerization initiator to the mixtures to support the polymerization process in order to form a living polymer.

Graafland et al is instead titrating a mixture of the monomer and initiator using a microstructure control agent in order to control the vinyl content of the resulting polymer. This differs in that the present process utilizes the initiator to consume the impurities in the reactants prior to adding an effective amount to support polymerization.

In the rejection, the Examiner notes that “[i]t has been well established that the disclosure of components in a reference may be anticipatory even though the reference indicates that the components [are] not preferred or even that it is unsatisfactory for the intended purpose”. Applicant maintains that neither the Graafland et al or Bening et al reference disclose the critical process step regarding titration as claimed in the present process. Furthermore, simply because Graafland et al utilizes a microstructure control agent, an initiator and monomer is not sufficient to render the present process claims unpatentable since it is the manner in which these components are being utilized that is claimed in the present case. Applicant is claiming a process. Graafland et al do not add the initiator in two stages but instead titrate the mixture of monomer and initiator by adding the microstructure control agent in doses. The purpose of this is to control the vinyl content of the polymers, not to eliminate impurities which would prevent polymerization or cause premature chain termination. More specifically, Graafland et al disclose a process for the polymerization of dienes which comprises anionically polymerizing dienes in the presence of an anionic polymerization initiator and a microstructure control agent wherein the process is improved by adding the control agent to the polymerization mixture in two or more doses to closely control the vinyl content of the polymer produced.

Applicant further disagrees with the Examiner’s statement that “[t]he teaching of adding the microstructure agent at the “startup” of the polymerization process would necessarily meet the requirement of the instant “titration” step.” Applicant maintains that this would simply result in the addition of the microstructure agent at the beginning of polymerization. It does not teach the addition of initiator in two separate charges.

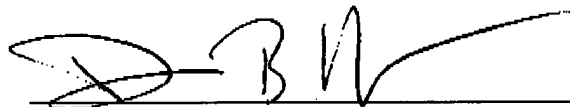
Bening et al does not add anything to the teachings of Graafland et al which would lead one of ordinary skill in the art to the presently claimed invention.

Accordingly, in the absence of some teaching or suggestion in Graafland et al and/or Bening et al that it is necessary to titrate the admixture with initiator followed by a second charge of initiator as in the present process, it cannot be said that Graafland et al, in view of Bening et al, renders Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29, unpatentable. Applicant therefore requests that the rejection of the claims of the present application under 35 U.S.C. § 103(a) as being unpatentable over Graafland et al, in view of Bening et al, be respectfully withdrawn in view of the above arguments.

#### Conclusion

In view of the above, Applicant maintains that Claims 1 to 5, 7, 11 to 14, and 16 to 19, as amended, and newly added Claims 20 to 29 are patentable over the prior art cited by the Examiner and respectfully request allowance of said claims.

Respectfully submitted,



Donna B. Holguin  
Registration No. 38,082  
KRATON Polymers U.S. LLC  
3333 Highway 6 South, Rm. CA-108  
Houston, TX 77082  
281-668-3224 (Phone)  
281-668-3155 (Fax)